ESE standards process RFC

Status of this Memo

This memo provides information to the NASA Earth Science Enterprise (ESE) community. This memo does not specify an ESE standard but is a technical note. Distribution of this memo is unlimited.

Abstract

This document describes the process of adoption of standards by the ESE Standards Process Group. It describes the process of developing the initial standards Request For Comment and then describes the process by which it can become an ESE standard. Descriptions of the players and documents are included.

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1 Introduction

The primary goal of the ESE standards process is to facilitate interoperability among components of the ESE network of data systems. Establishment of appropriate standards enables flexibility as future data and service providers will have well-defined access points to join the ESE network of data systems. This flexibility is central to supporting the evolving strategies of the ESE. In order to accomplish these goals, the standards process needs to focus on adopting standards that are relevant to the ESE network of data systems and that have mature implementations and operational experience. The standards process is also designed to encourage community participation in order to leverage community expertise, ideas, and capabilities.

In studying examples to model the ESE process after, the SEEDS Standards Study Team found the Internet Engineering Task Force (IETF) experience to be particularly pertinent. The IETF has been remarkably effective in setting standards for the Internet - enabling explosive growth both in user base and in functionality. Its process has demonstrated scalability and relevance amid rapidly evolving technology. The IETF process provides simplicity of structure, technical excellence, prior implementation and testing, clear and concise documentation, openness and fairness, and potential for timeliness. For these reasons, the standards process is modeled after

the IETF process. As described below, the ESE process has been adapted to meet additional ESE mission requirements of assured timeliness and accountability and to assure domain applicability and operational maturity of standards adopted by ESE.

ESE stakeholders recognize that Earth Science is a diverse field and that standards setting must accommodate both "core" standards and "community" standards. Core standards are those that are mandated and supported across the entire ESE whereas community standards are those that are adopted by one or more specific communities without being mandated for use everywhere.

A primary concern is to foster adoption of a set of "working edge" standards. That is, in order to adopt a proposal as an ESE standard, there must be evidence both of successful domain implementation and positive operational experience. Community input is sought at each stage of decision making to ensure broad review and garner broad support.

The focus on working standards means that decisions are oriented towards the adoption of standards rather than the development of standards. There are a number of reasons for this. Foremost is the fact that standards under active development present moving targets and are often not stable enough for operational use. The development of standards can be time consuming and expensive. As there are already many venues where standards are under active development, the goal of the ESE's standards process is therefore to provide a means whereby standards that are already implemented and have proven their usefulness in the ESE context can be further adopted into general use by the ESE. By thus expanding the use of "good" standards, those standards become even more useful.

In structure, the ESE standards process consists of cycles of gathering input, publishing the proposed documents, gathering public comment, and deciding whether the process should move ahead or not. The completion of the process results in recommendations to ESE management on adoption of well-specified standards or technical notes.

2 The Players

The players involved in the ESE's standards process include the following:

2.1 Earth Science Enterprise Management

The role of ESE management in the standards process is to perform such financial, legal, and logistical tasks as necessary and to act on recommendations from the SPG as appropriate.

2.2 The Standards Process Group (SPG)

The Standards Process Group (SPG) is the decision-recommending board of the standards process. SPG decisions have force only with ESE management concurrence. The membership of the SPG and their roles are detailed in Sections 4 and 5.

2.3 RFC Editor

The primary standards process documents are called Request For Comments (RFCs) defined in section 3 below. The RFC editor is responsible for logistical coordination of RFCs including assuring that RFC submittals follow established standards for content coverage and format and that the RFC library is maintained and is accessible. The editor will work with submitters to

advise on content and format, but the ultimate responsibility for providing a sufficient RFC in acceptable format rests with the author(s) of the RFC.

2.4 Technical Working Groups (TWGs)

Technical Working Groups (TWGs) are commissioned by the SPG to perform specific review and evaluation of candidate standards, related implementations, and operational experience. Membership on a TWG is partially drawn from the SPG membership and partly drawn from technical area experts and/or ESE community members. The duration of a TWG corresponds to the review schedule set by the SPG for a particular candidate standard.

2.5 Process Participants

Process participants are individuals, but they may often act as representatives of stakeholder programs, projects, tasks, or communities affected by standards under consideration. There is no restriction on who may be a process participant, but direct stakeholders funded by the ESE necessarily dominate the process of adopting standards for the Enterprise.

2.6 Public

The public includes all process participants, all ESE stakeholders, and all those who are generally understood to be the "public". Any person may make comment on RFCs under consideration. Specific procedures to ensure fair and appropriate public comment will be developed by the SPG.

2.7 Stakeholders

Stakeholders are those who are materially affected by the work of the SPG. The SPG has a direct interest in stakeholders because the success of standards recommended by the SPG is ultimately determined by the use of those standards by programs, projects, tasks, or other activities directed by or performed by SPG Stakeholders.

3 Classification of Request For Comments (RFCs)

The primary process documents are called Request For Comments (RFCs) and are similar to the RFCs established by the IETF. However, these RFCs have been tailored to meet ESE unique requirements and needs. There are two main series of RFCs. Those containing technical information relevant to ESE activities, but not considered to be standards are technical notes. The other category of RFCs is called the standards track, and is related to the development of standards, starting from a proposed standard which can be promoted to a draft standard and finally declared officially an ESE standard after going through the standards process detailed in this document.

A unique ESE-RFC number listed in the header identifies each RFC. In addition, the header contains the RFC category (technical note or standards track), the RFC status (updates, obsoletes), the author's name, the submission date, and a title. RFC numbers are assigned by the RFC Editor after a review and evaluation of the proposal by the SPG.

3.1 Technical Note

A technical note is a document that contains useful information but is not a standard. A proposed standard that went through the standards process and did not become a standard may be designated a technical note by the SPG because it contained important and useful information. Standards process participants can also directly submit technical notes. For example, the RFC Editor may publish technical notes for information purposes only.

3.2 Standards track

An RFC is considered to be on the standards track if it is within the life cycle of the standards process.

3.2.1 Proposed Standard

An ESE proposed standard is relevant to the domain of ESE data systems, is generally stable, has sufficient specificity, is believed to be well understood, and appears to enjoy enough community interest to be considered valuable. However, further experience might result in a change or even retraction of the proposed standard before it advances.

3.2.2 Draft standard

To become a draft standard, a proposed standard must be technically of high quality, well understood and known to be quite stable, and must have 2 successful implementations demonstrating the standard has been fully tested and implemented in a real environment. It should be noted that in standards process terminology, a single independent implementation and an instantiation of the implementation by a different independent project counts as two independent implementations.

3.2.3 ESE standard

Finally, a draft standard becomes an ESE standard when significant and successful operational experience has been obtained, the standard has demonstrated a high degree of technical maturity, and also has garnered significant positive interest from the ESE community. By this, the process ensures that ESE standards are well accepted and that they provide significant benefit to the ESE community.

3.3 Categorization of Standards

There are many ways of categorizing standards. One can categorize standards by the process used in their development. For instance, *de facto* standards are used extensively but are not ratified by a standards organization such as ISO (International Organization for Standardization). *De jure* standards are ratified by a standards organization. Another alternative addressed by the ESIP Federation specific to ESE standards is to distinguish standards by how their use is enforced, leading to the notion of core standards and community standards. For instance a standard may be required to be adopted and implemented by all ESE projects while another standard may be limited to a specify community.

3.3.1 Core Standard

A core standard is critical to one or more projects and is consequently mandatory, if applicable, across ESE and is funded and supported by ESE. Designating a standard as a core standard implies acceptance of the standard across all communities. Possible examples of core standards could be Hierarchical Data Format (HDF) or Global Change Master Directory's Data Interchange Format (DIF)

3.3.2 Community Standard

A community standard is recommended by self-formed communities but not required by ESE. A community standard may be widely accepted by one or several specific communities but not by others. In this case, the standard is called a community standard, is not mandatory, and is not necessarily funded or supported by ESE. Possible examples of community standards could include an atmospheric profile built upon the HDF library or an interface for community focused applications to access ESE data.

4 ESE Standards Process

This section describes the ESE Standards Process. Section 4.1 describes the groups and individuals who participate in the process. Sections 4.1 and 4.2 describe the two distinct phases of the process. The first phase consists of developing an RFC and the second phase consists of the process through which the RFC is approved. Figure 4-1 and description and the figures contain cross-references in the form of numbered items.

4.1 Path to RFC

The RFC process might be set in motion by many sources of standards, or of requirements for standards. In particular, standards track RFCs may be solicited in response to ESE program or project requirements. Developers or users of a standard or common practice may also submit an unsolicited RFC to the SPG for consideration. Figure 4-1 illustrates these two paths to producing an ESE RFC.

Regardless of whether the RFC was produced under the "Solicited" path (Section 4.1.1) or the "Unsolicited" path (Section 4.1.2), once the RFC is ready, it can be submitted into the approval process (Section 4.2). A separate document, *ESE-RFC 003 - Instructions to RFC Authors,* describes the form and content of an RFC.

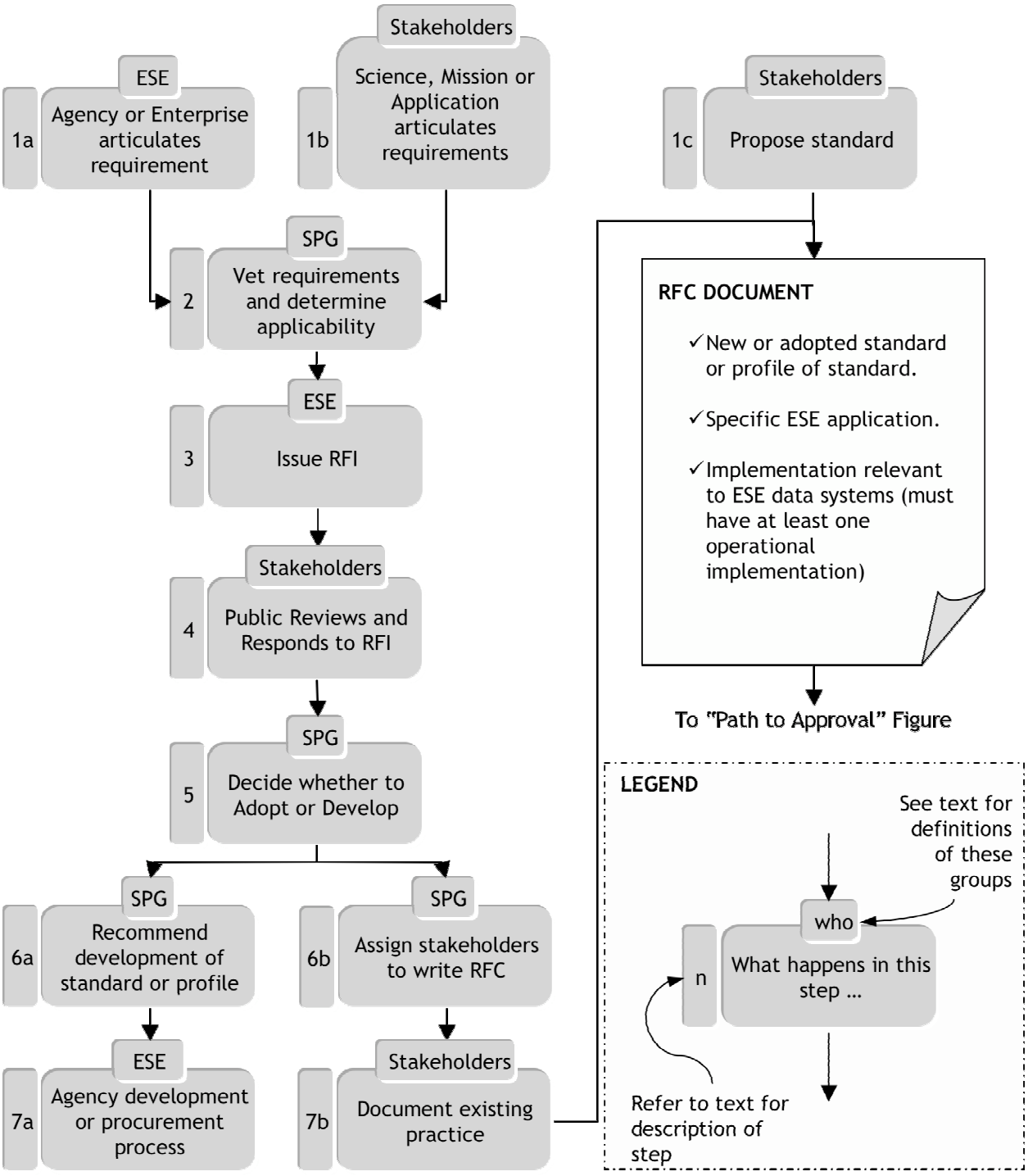

Figure 4-1: standards process: Path to RFC

4.1.1 Solicited

(1a) Standards track RFCs may be solicited in response to mandates from ESE management, based on NASA requirements or on Congressional mandates, international agreements, inter-agency agreements, etc.

(**1b)** The RFC process may also be initiated in response to requirements from mission systems, science or applications groups, or other project needs.

(2) In either case, the SPG will review the new mandate or requirements to determine general applicability within ESE. At this stage, the SPG may develop requirements for ESE implementation of the mandate, or refine the project requirements for applicability to ESE as a whole, in order to identify a new interface or capability that would benefit from an ESE standard.

(3) The result of this requirements review will be a Request For Information (RFI) about potential standards for the identified interface or capability. A specific potential standard may be identified in the RFI – for example, the mandate may name the standard to be implemented – or the RFI may request suggestions for potential standards to meet the needs identified.

(4) Anyone may comment on an ESE RFI. Community response may include suggestions to adopt or modify an existing standard, or ideas for new standards. When drawing on existing standards, the public may recommend *de jure* standards from standards organizations, or *de facto* standards from vendors or other groups.

(5) After the public comment period, the SPG will evaluate all responses to the RFI and recommend either adoption of an existing or emerging standard, as is, development of a profile or extension of an existing or emerging standard, or development of a new standard.

(6a) If the SPG recommends development of a new standard or profile, ESE management will determine whether or how to implement that new development. Note that standards development is not part of this standards process.

(6b) If the SPG recommends adoption of an existing standard, SPG will consult with ESE management to confirm ESE support for the recommendation, and will ask a group or individual to draft an RFC documenting the proposed standard. Potential candidates to draft the RFC include the original developer of the standard, or the member(s) of the ESE community who recommended the standard for adoption.

(7a) The development of a technical standard is not part of this standards process. If the SPG recommends development of a new standard or profile or extension of an existing standard, ESE management will accomplish this development through any appropriate mechanism. These mechanisms may include issuance of new contract tasks, cooperative agreements, grants, or other procurements. Standards development may be accomplished by working though standards development bodies or may be independently pursued.

(7b) Implementation may also be accomplished by assignment to existing ESE implementing projects or programs.

4.1.2 Unsolicited

(1c) A prime source for ESE standards is the community of users, who may recommend standardization of particular tools, protocols, external standards, or formats that have been found to be particularly useful. In addition, a vendor may choose to document a particular implementation or format for possible adoption as an ESE standard. While these groups may respond to an ESE RFI with their recommendations, they may also draft an RFC documenting the potential standard and submit it to the SPG unsolicited.

Anyone can submit an unsolicited RFC as a technical note or for ESE standards track consideration.

4.2 Standards Approval Process

A group or an individual can submit an RFC document to the SPG. Section 4.1 describes the different ways an RFC document may be generated. Both standards track RFCs and technical note RFCs will be evaluated for approval through the standards process. The evaluation is based on the standards specification, two independent implementations, and operational experience. As mentioned above, in the ESE environment, a single independent implementation and an instantiation of the implementation by a different independent project counts as two independent implementations.

The Figure 4-1 shows the overall flow of the three phases of the approval portion of the standards process: the initial screening; review with 2+ implementations; and review with operational experience. The three phases are discussed below. All RFCs, review announcements, comments received, supporting documents and other related materials will be maintained by the SPG as outlined in Section 5.

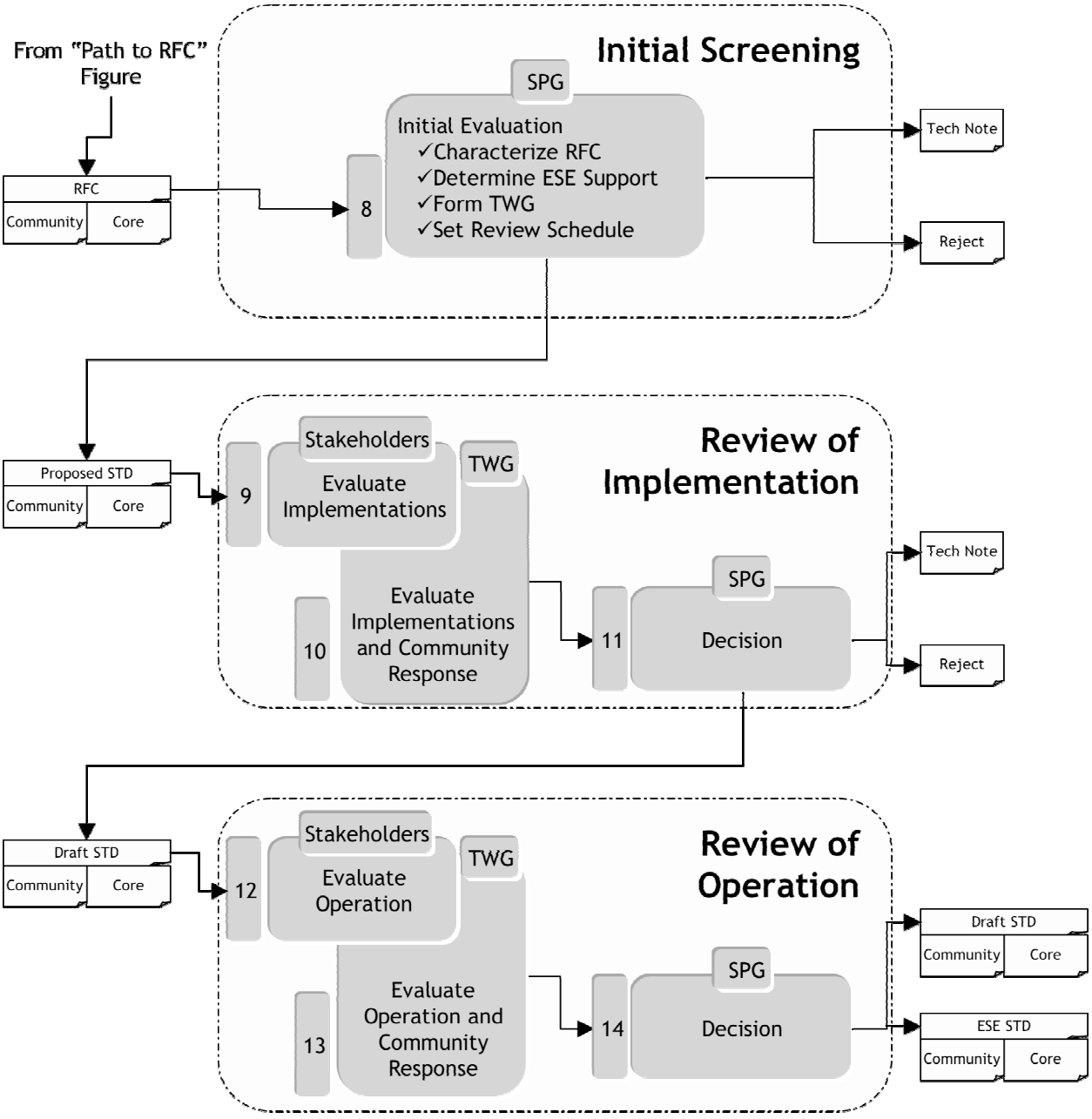

Figure 4-2: Path to Approval

4.2.1 Initial Screening

(8) The SPG will perform an initial evaluation and screening of the RFC to determine if it is a standards track document, or if the RFC is a technical note, or if the RFC is without merit and should be rejected. Although all standards track RFCs are evaluated on the complete set of required components (standards specification, two independent implementations, and operational experience), in this initial screening phase the RFC needs to contain only the standards

specification and a reference to one implementation. Information about the second independent implementation and operational experience may be added later in the standards process.

If the RFC is without merit and rejected, the SPG will communicate this to the RFC author. If the RFC is a technical note, then the RFC will be permanently archived by the SPG and made available on the SPG website.

If the RFC is a standards track document, then the SPG will work with ESE management to determine the scope of the applicability of the proposed standard, whether it applies to a defined community or whether it applies across the ESE data systems as a core standard. If the SPG determines that the RFC is a potential core standard, the SPG will also determine whether a proposed standard has ESE support as a core standard. All core standards need ESE support.

If the RFC is a proposed standard, then the SPG will form a TWG to give an objective technical evaluation of the proposed standard and the two independent implementations. The SPG will identify and select members of the TWG. The selection will be based on applications from ESE community members to be on the TWG as well as identification and invitation of notable technical experts.

The SPG will set the review schedule for the proposed standard. If the proposed standard is a candidate core standard, then the scope of the review is expected to be very extensive and broad, with stakeholders from the diverse ESE communities being represented. If the proposed standard is a candidate community standard, the scope of the review is within one community, and as a result, is much more narrowly focused. The review schedule can also vary based on the characteristics of the proposed standard. E.g. a *de facto*, widely used standard may only need a short review cycle whereas a new core standard may need a longer review cycle.

4.2.2 Review of Implementation

In this phase of the standards process, the SPG will conduct a public review of the proposed standard by reviewing the standards specification document and the two independent implementations. If the RFC was submitted with only one implementation, then this phase will be postponed until the RFC author submits information about the second independent implementation. If the RFC author does not submit information about the second implementation within the allowed time limit, which is determined by the SPF, then the proposed standard will be rejected.

(9) The SPG will announce a public review of the proposed standard and the two implementations. The breadth of the announcement of public review depends on whether the proposed standard is a core or community standard. The SPG may solicit key ESE stakeholders to comment on proposed core standards.

(10) The TWG will also meet and conduct its objective technical review and assessment.

(11) The SPG receives the public comments and the TWG's evaluations. The SPG will make a recommendation to ESE management on whether to promote the proposed standard to a draft standard. If the proposed standard needs revision, the SPG will determine if the revisions needed are editorial in nature, in which case the proposed standard will continue in the standards track after the editorial revisions are completed, or whether the revisions needed affect the technical

content of the proposed standard. If revisions affecting the technical content of the proposed standard are needed, the SPG will notify the RFC authors and the proposed standard will be rejected. The RFC authors can resubmit their RFC after completing the revisions but must start from the beginning of the standards process again. The proposed standard can be rejected at this phase for varied reasons, or designated to be a technical note. If the proposed standard is designated to be a technical note, the SPG will permanently archive the RFC and make it available on the SPG web site.

If the proposed standard is promoted to a draft standard, then the third phase of the standards process is initiated.

4.2.3 Review of Operation

In this phase of the standards process, the SPG will conduct a public review of the draft standard specification, the two independent implementations, and operational experience. If the RFC was submitted without information about operational experience, then this phase is postponed until the RFC author submits information about the operational experience. If the RFC author does not submit the information about the operational experience within the allowed time limit, which is determined by the SPG, then the draft standard will be rejected.

(12) The SPG will announce a public review of the draft standard, the two independent implementations, and the operational experience. If the draft standard is a core standard, the SPG may solicit key ESE stakeholders to comment on the draft standard.

(13) The TWG will also meet and conduct its objective review and assessment. Although the operational experience is the only new part in this phase of the review, the standards document and the two implementations may also be reviewed again.

(14) The SPG will receive public comments and the TWG's evaluations. The SPG will make a recommendation to ESE management on whether to promote the draft standard to an ESE standard, or whether to demote the draft standard to be a technical note, or to reject the draft standard altogether. If the draft standard needs revision, the SPG will determine if the revisions needed are editorial in nature, in which case the draft standard will continue in the standards track after the editorial revisions are completed, or whether the revisions needed affect the technical content of the draft standard. If revisions affecting the technical content of the draft standard are needed, the SPG will notify the RFC authors and the draft standard will be rejected. The RFC authors can resubmit their RFC after completing the revisions but must start from the beginning of the standards process again.

If the draft standard becomes an ESE core standard, technical support will be provided for the new ESE standard. All ESE standards, core or community, will be available on the SPG web site. The SPG will also make available other related information, such as public comments, TWG recommendations, and meeting notes.

5 Notice and Record Keeping

The SPG will maintain a web site containing the record of SPG standards-related activity that shall include at least the following:

1. The charter of the SPG [1]
2. Instructions of RFC Authors [2] and RFC template
3. Announcements related to RFCs
4. Public comments
5. RFC documents and supporting materials as outlined in [2]
6. Minutes of SPG meetings.
7. A list of all RFCs and their status (e.g. where they are in the process; which ones are current standards, obsolete, etc.)

6 SEEDS Coordination

7 References

7.1 Normative References

[1] ESE-RFC 001 - Charter of the SEEDS Standards Process Group (SPG)

[2] ESE-RFC 003 - Instructions to RFC Authors

7.2 Informative References

None.

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Appendix A Glossary of Acronyms

Acronym	Description
ESE	Earth Science Enterprise: See http://www.earth.nasa.gov/
ESIP	Earth Science Information Partners: See http://esipfed.org/
DIF	Directory Interchange Format: A metadata format for Earth Observation data. Used as an example.
HDF	Hierarchical Data Format: A data format for Earth Observation data. Used as an example.
IETF	Internet Engineering Task Force: See http://www.ietf.org
ISO	International Organization for Standardization: See http://www.iso.org
NASA	National Aeronautics and Space Administration: See http://www.nasa.gov
RFC	Request For Comment: See Section 2 of this document.
RFI	Request For Information: See Section 4.1 of this document.
SEEDS	Strategy for the Evolution of ESE Data Systems: SEEDS is the name given to the study that produced the initial concept for the ESE Standards Process. See http://eos.nasa.gov/seeds
SPG	Standards Process Group: See Section 2 of this document and also ESE-RFC 001 [2].
TWG	Technical Working Group: See Section 2.4 of this document.